

**REMARKS**

Claims 1-3, 5-9, and 11-16 are pending in this application. By this Amendment, the specification and claims 1, 2, 8, 11, 12, and 15 are amended and claims 4 and 10 are canceled. Support for the amendments to the claims may be found, for example, in the specification at page 29, line 26 to page 30 line 8 and the original claims as filed. No new matter is added.

In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

**I. Interview**

The courtesies extended to Applicants' representative by Examiner Jackson at the interview held March 12, 2009, are appreciated. The reasons presented at the interview as warranting favorable action are incorporated into the remarks below and constitute Applicants' record of the interview.

**II. Claim Objections**

The Office Action objects to claims 4, 11, and 12 for various informalities. By this Amendment, claim 4 is canceled rendering it rejection moot. Claims 11 and 12 are amended according to the Examiner's helpful suggestions. Accordingly, reconsideration and withdrawal of the objections are respectfully requested.

**III. Rejection under 35 U.S.C. §112, Second Paragraph**

The Office Action rejects claims 1-16 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. By this Amendment, claim 4 and 10 are canceled rendering their rejection moot, and claims 1, 2, 8, and 15 are amended in light of the Examiner's comments. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

**IV. Rejections Under 35 U.S.C. §102**

The Office Action rejects claims 1-5, 7-9, and 13-15 under 35 U.S.C. §102(b) over U.S. Patent No. 6,824,827 to Katsuki et al. (hereinafter "Katsuki") and claims 1-3, 5-9, and 13-16 under 35 U.S.C. §102(b) over U.S. Patent Application Publication 2006/0115670 to Tanaka et al. (hereinafter "Tanaka"). By this Amendment, claim 4 is canceled, rendering its rejection moot. As to the remaining claims, Applicants respectfully traverse the rejections.

Without conceding the propriety of the rejection, independent claims 1 and 8 are amended to incorporate the subject matter of not rejected claim 10. Accordingly, the rejections are overcome. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

**V. Rejections Under 35 U.S.C. §103**

The Office Action rejects claims 1-16 under 35 U.S.C. §103(a) over U.S. Patent No. 6,956,098 to Summers et al. (hereinafter "Summers"); rejects claims 1-5 and 7-16 under 35 U.S.C. §103(a) over U.S. Patent Application Publication No. 2001/003020122 to Hara et al. (hereinafter "Hara"); rejects claims 1-16 under 35 U.S.C. §103(a) over U.S. Patent No. 6,956,098 to Watanabe et al. (hereinafter "Watanabe"); rejects claims 6, 10-12 and 16 under 35 U.S.C. §103(a) over Katsuki; and rejects claims 4 and 10-12 under 35 U.S.C. §103(a) over Tanaka. By this Amendment, claims 4 and 10 are canceled rendering their rejection moot. As to the remaining claims, Applicants respectfully traverse the rejections.

As amended, independent claim 1 recites in-part:

...at least one or more kind of element selected from Si, Ti, and Al are contained in an organic substance from the joining interface toward the metal layer, and the metal layer is formed on the thermoplastic film layer by a vapor deposition method.

Likewise, as amended, independent claim 8 recites in-part:

...forming a thermoplastic film containing thermoplastic on one side or both sides of the plastic film layer as a base body; and

thereafter forming the metal layer on the thermoplastic film layer by a vapor deposition method wherein before the metal layer is formed, an organic substance containing at least one or one kind of element selected from Si, Ti, and Al is deposited on the thermoplastic film layer.

The applied references fail to teach or to have rendered obvious, or establish any reason or rationale to provide, such a combination of features, as recited in claims 1 and 8, for the reasons discussed below.

### **Summers**

Summers is directed to polyimide compositions useful as dielectric materials. The Office Action asserts that Summers teaches that a coupling agent can be used as a pretreatment agent of the polyimide film. However, in Summers, the silane coupling agent is used for improvement of adhesive properties between the polyimide film and adhesives. See Summers, col. 14, lines 9-15, col. 13, lines 24-39, and col. 13, lines 12-23, reproduced below for convenience, respectively (emphasis added).

A coupling agent can be used as a pretreatment of the polyimide film, preferably at the gel or partially cured stage. It may be performed by for example applying a coupling agent solution on the surface of the film, lapping the surface of the film with a coupling agent solution, spraying a coupling agent solution onto the surface of the film, immersing the film in a coupling agent solution.

The adhesion strength of the above-described laminates can be improved by employing various techniques for elevating adhesion strength. For example, prior to the step of applying the adhesive onto the polyimide film or laminating an adhesive sheet thereon, the polyimide film can be subjected to a pre-treatment step (heat treatment, corona treatment, plasma treatment under atmospheric pressure, plasma treatment under reduced pressure, treatment with coupling agents (like polyamic acids oligomers and silanes), sandblasting, alkali-treatment, acid-treatment, etc.). To improve the adhesion strength, it is generally also possible to add various metal compounds as disclosed, for example, in U.S. Pat. No. 4,742,099 incorporated herein by reference, (tin compounds, titanium compounds, etc.) to the polyamide acid or to apply various metal compound solutions onto the gel film.

In alternative embodiments, the adhesive is omitted. The adhesive may be omitted by casting polyamic acid solution onto a metal substrate, and thereafter drying and curing the polyamic acid solution to create the polyimide film. Alternatively: i. a polyimide film of the present invention can be sputtered with a metal; or ii. the metal and polymer layers can be bonded together by heat and pressure.

Thus, Summers only discloses that the pretreatment step with coupling agents should be performed prior to the step of applying the adhesive. In contrast, in claims 1 and 8, the silane coupling agent is between the thermoplastic film layer and a metal layer. Additionally, Summers discloses that for alternative embodiments, utilizing techniques such as sputtering, the adhesive is omitted and, thus there would be no reason or rationale for subjecting the polyimide film of Summers to a pre-treatment step.

Therefore, because the elevated adhesion strength only applies to steps prior to applying the adhesive, one having ordinary skill in the art at the time of the invention would not have been motivated to subject a plastic to pretreatment steps with coupling agents with a reasonable expectation of successfully achieving the metal coated substrate and manufacturing method of a metal-coated substrate of claims 1 and 8, respectively.

Accordingly, for at least the foregoing reasons, Applicants respectfully submit that claims 1 and 8 would not have been rendered obvious by Summers. Therefore, claims 1 and 8 and their dependent claims are patentable. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

#### **Hara**

The Office Action acknowledges that Hara does not teach the use of a Si, Ti or Al compound. See Office Action, page 8. However, the Office Action alleges that it would have been obvious to have substituted the organic silane coupling agents, titanium coupling agents and aluminum coupling agents because they are surface treatment agents. Applicants respectfully disagree.

The Abstract of Hara states that "a laminate having an excellent adhesion strength between a conductor layer and a polyimide film can be obtained without performing any surface roughening treatment or using any adhesive metal layer" (emphasis added).

Therefore, Hara discloses that the surface of the polyimide film is not specially treated and, thus, neither the disclosure of Hara nor the Office Action establishes any reason or rationale to provide an organic substance containing at least one or one kind of element selected from Si, Ti, and Al as the silane coupling agent, as required by claim 1 and 8.

Thus, the rejection is improper because Hara would not have rendered obvious the claimed invention, at least because the Office Action has failed to establish a proper *prima facie* case of obviousness. To the extent the assertions in the Office Action are based on official notice, such basis is not properly established and are thus improper.

Furthermore, the rejections are improper because the Office Action fails to provide a clear articulation of the rejection. MPEP § 2143 states that "[t]he key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. §103 should be made explicit" (emphasis added). The Office Action has not made such a clear articulation, and must do so in order to continue to support the claim rejections.<sup>1</sup>

For example, as indicated above, the Office Action states on page 8 that it would have been obvious to have substituted the organic silane coupling agents, titanium coupling agents and aluminum coupling agents because they are surface treatment agents. However, this limitation is not disclosed in Hara. At most, it appears that the Office Action may be taking

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<sup>1</sup> To the extent that any such clear articulation or adequate reasoning for the obviousness rejections is included in a subsequent Office Action, such subsequent Office Action should be made non-Final.

Official Notice that all coupling agents will behave identically. However, the application of Official Notice is not established and thus is improper in this case.

With respect to Official Notice, the MPEP states that “such rejections should be judiciously applied” (see MPEP § 2144.03). “Official notice without documentary evidence to support an [E]xaminer’s conclusion is permissible only in some circumstances” (see MPEP § 2144.03(A)). “It would not be appropriate for the [E]xaminer to take official notice of facts without citing a prior art reference where the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well-known” (see *Id.*, emphasis added).

For at least the foregoing reasons, Applicants respectfully submit that claims 1 and 8 would not have been rendered obvious by Hara. Therefore, claims 1 and 8 and their dependent claims are patentable. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

#### **Watanabe**

Watanabe is directed to polyimide compositions useful as dielectric materials for supporting or fixturing electronic circuits, electronic devices, or the like. The Office Action acknowledges that it is the metal (not the thermoplastic film layer, as required by claims 1 and 8), which is treated with the aluminum alcoholates or chelates or silane coupling agents. See Office Action, pages 8 and 9. The Office Action asserts that it would have been obvious to one of ordinary skill in the art at the time of the invention to produce the double-sided laminate of Watanabe by sputtering and/or plating of the copper layers directly on a pre-formed polyimide comprising the three layer structure taught by Watanabe, wherein the silane coupling agent is applied to the polyimide as opposed to the surface of the metal. Applicants respectfully disagree.

Watanabe discloses that flexible printed circuit base materials are formed by applying the coupling agent to a surface of metallic foil formed beforehand, and applying and heating a

precursor solution of polyimide. Watanabe further discloses the use of aluminum alcoholates, aluminum chelates, or silane coupling agents for the chemical or mechanical treatment of conductors to improve adhesive strength. The Office Action's proposed modification of forming the metal by direct deposition into the polyimide layer precludes the chemical and mechanical treatment beforehand for improving the adhesive strength of the metal to the polyimide layer and, thus, obviates the need for the aluminum alcoholates, aluminum chelates, or silane coupling agents of Watanabe.

Accordingly, if the metal layer is directly deposited by vapor deposition, for the reasons discuss above there would be no reason or rationale for one of ordinary skill in the art to provide an organic substance containing at least one or one kind of element selected from Si, Ti, and Al as the silane coupling agent, as required by claim 1 and 8. Thus, the rejection is improper, because Watanabe would not have rendered obvious the claimed invention, at least because the Office Action has failed to establish a proper *prima facie* case of obviousness. Clearly, the applied reference is applied only based on the impermissible hindsight provided by the present claims.

Furthermore, in Watanabe, since the silane coupling agent, etc., is applied on the surface of metallic foil formed beforehand, molecules of the silane coupling agent extend from the surface of metallic foil toward inside of the polyimide film. In contrast, in claim 1, since the metal layer is formed by the vapor deposition method after sticking the silane coupling agent on the thermoplastic film layer, molecules of the silane coupling agent extend from the surface of thermoplastic film layer towards inside of the metal layer.

Thus, when comparing the molecular size of the precursor of polyimide used in Watanabe with the size of the metal atom of the metal layer of claims 1 and 8, the metal atom is significantly smaller. Accordingly, when the metal layer is formed by the vapor deposition method after sticking the silane coupling agent on a thermoplastic film layer as in claims 1

and 8, metal atoms can enter gaps between silane coupling agents, which adhere to the surface of thermoplastic film layer during film formation by the vapor deposition method, and the film formation proceeds until the gaps are filled up and the layer is built up. Therefore, the adhesion between the thermoplastic film layer and the metal layer increases.

In contrast, in Watanabe, the precursor cannot enter the gaps because the molecular size of the precursor is obstructive, and the polyimide film is formed with the gaps remaining. Accordingly, if the silane coupling agent is used on the surface of the metallic foil formed beforehand, the adhesion between the thermoplastic film layer and the metal layer is not improved as much as in claims 1 and 8.

For at least the foregoing reasons, Applicants respectfully submit that claims 1 and 8 would not have been rendered obvious by Watanabe. Therefore, claims 1 and 8 and their dependent claims are patentable. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

#### **Katsuki and Tanaka**

Because of the similarity of the arguments with respect to these rejections they will be addressed together. The Office Action acknowledges that neither Katsuki nor Tanaka teach an organic coupling agent as instantly claimed. See Office Action, pages 10 and 11. However, the Office Action alleges that it would have been obvious to have substituted the organic silane coupling agents, titanium coupling agents and aluminum coupling agents because they are surface treatment agents. Applicants respectfully disagree.

Claims 4, 6, 10-12 and 16 variously depend from claims 1 and 8 and, thus, require all the limitations of claims 1 and 8. Accordingly, the deficiencies of Katsuki and Tanaka with respect to claims 1 or 8 are equally applicable to claims 4, 6, 10-12 and 16.

As discussed above, Katsuki and Tanaka each fail to disclose, and likewise fail to teach or suggest, or establish any reason or rationale to provide each and every limitation of

independent claims 1 and 8, from which claims 4, 6, 10-12 and 16 depend. Accordingly, claims 4, 6, 10-12 and 16 are patentable because the applied references fail to teach or render obvious, or establish any reason or rationale to provide all the features of independent claims 1 and 8.

Furthermore, the rejections are improper because the Office Action fails to provide a clear articulation of the rejection. MPEP § 2143 states that “[t]he key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. §103 should be made explicit” (emphasis added). The Office Action has not made such a clear articulation, and must do so in order to continue to support the claim rejections.<sup>2</sup>

For example, as indicated above, the Office Action states on pages 10 and 11 that it would have been obvious to have substituted the organic silane coupling agents, titanium coupling agents and aluminum coupling agents because they are obvious surface treatment agents. However, this limitation is not disclosed Katsuki or Tanaka. At most, it appears that the Office Action may be taking Official Notice that all coupling agents will behave identically. However, the application of Official is not established and thus is improper in this case.

For at least the foregoing reasons, Applicants respectfully submit that claims 1 and 8 would not have been rendered obvious by the applied references. Therefore, claims 1 and 8 and their dependent claims are patentable. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

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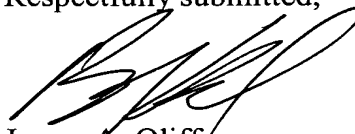
<sup>2</sup> To the extent that any such clear articulation or adequate reasoning for the obviousness rejections is included in a subsequent Office Action, such subsequent Office Action should be made non-Final.

**VI. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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